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Grass and Legume Pastures

Cooperative Extension, South Dakota State University

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STARTING AND MANAGING

Grass and Legume Pastures In Eastern South Dakota

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Good stands of grass and legume for pastures or hay crops don't just happen. Your success depends on careful planning.

Specific practices can be put into operation to insure good stands. Some practices relate to seed, such as mixing legume and grass, selection of high quality seed, selection of proper seeding equipment, seed treatment, and inoculation of legumes. Other practices relate to soil management. These include proper preparation of seed bed, accurate time and rate of seeding, fertilization, use of companion crops, and land management by grazing or clipping in both new and established pasture stands.

If you operate a farm in eastern South Dakota, the following information about each of these practices can help you plan good pasture stands or hay crops. Much of this information is for starting and managing stands for pasture use; the same principles, however, apply to meadows or hay crops.

PLANT A GRASS AND LEGUME MIXTURE

Grass and legume mixtures are recommended because (1) the mixture usually produces greater forage production, (2) grasses with a legume contain a higher percentage of protein than grass grown alone, (3) the inclusion of a grass (at least 50%) with a legume may reduce bloat, (4) grasses reduce soil erosion and improve soil structure, (5) seeding of a mixture provides more assurance of a stand.

Tame grasses and legumes produce more forage than do native or permanent type pasture grasses. Research yield trials show that the adapted tame grasses will produce more than twice as much pasturage as native grasses, either under dryland or irrigation conditions. A general recommendation is that all tillable land to be used for pasture should be seeded to a tame grass and legume mixture. Land that is rough and highly erodible, stony, or low and wet should generally remain in the more permanent type grasses. Pasture on this type of land can, however, be improved through proper management and fertilization.

USE HIGH QUALITY SEED OF ADAPTED VARIETIES

The use of high quality seed is important in the establishing of pasture grasses and legume stands. High quality seed is mature and plump, pure and of high germination. Plump, high test weight seed will produce larger and stronger seedlings. Seedling vigor is important in establishing successful stands.

So-called "bargain" seed is often the most expensive. Seed should be purchased on the basis of "pure live seed" (PLS). The percent of pure live seed is determined by multiplying purity times germination.

Example: Grass seed: Sample A has a purity of 60% and a germination of 80% and at a bargain price of 20 cents per pound. The percent of pure live seed is 48 (60% x 80%). On the basis of pure live seed, the cost of this seed is about 42 cents per pound ($.20 divided by 48%). **Sample B** has a purity of 90% and a germination of 90% with a price of 30 cents per pound. The percent of pure live seed is 81 (90%x90%) and the pure live seed cost is 37 cents per pound ($.30 divided by 81%). On this basis, Sample A is costing 5 cents more per pound than Sample B.

Seeding rates are based on seed of high purity and germination analysis. If either purity or germination or both are below standard, the rate of seeding must be increased correspondingly.

Selection of adapted and recommended varieties is important. Southern varieties or strains lack winter hardiness and some northern strains do not withstand hot, dry summers. Disease susceptible, non-hardy or drought susceptible varieties are usually short-lived under pasture conditions.

Common tame grasses adapted for pastures in eastern South Dakota are smooth bromegrass, Intermediate wheatgrass and crested wheatgrass. Crested is adapted in the areas toward the center of the state. Reed canarygrass is best for low, wet areas which are not alkaline. Tall wheatgrass grows well on wet areas having alkaline conditions.

Alfalfa is the only legume generally recommended for pastures which are to be maintained for two or three years. Most alfalfa varieties are of the hay type and not particularly adapted for pasture purposes.

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These must be used until better pasture types are developed. Teton alfalfa, developed by the South Dakota Experiment Station, is an alfalfa that fits well into grass and legume mixtures for pasture use. (Seed of Teton will be available for limited use in 1961.)

Birdsfoot trefoil, Empire variety, may be used in lieu of alfalfa in areas where rainfall is favorable. It winter kills more readily than alfalfa. While Birdsfoot eliminates the bloat problem, stands are more difficult to obtain and take longer to establish than alfalfa.

Sweet clover and red clover may be used in the mixture and especially in short rotations. Alsike clover can be grown in the mixture for wet areas and it is quite tolerant to alkaline conditions.

TIME OF SEEDING

Early spring is the common seeding time and is better than late spring. About 30 days are required for a grass or a legume to germinate and become well established. The cool, moist conditions of early spring are favorable for seedling growth.

Seeding in the fall, either early or just before the ground becomes frozen, is possible. Seeding can be done August 15 to September 1 if good moisture conditions prevail. Early fall or late summer planting on summer-fallowed land is satisfactory, because of the conservation of moisture. A light seeding of oats may be seeded as a cover crop to prevent soil erosion. Late August plantings allow the grass and legumes to become established before the soil freezes and the seedlings have a much better chance of surviving the winter. It must be stressed, however, that establishment of grasses at this time is less risky than that of legumes since a legume plant must have ample time to build-up root reserves for the winter if it is to survive.

Very late fall seeding should be made when fall growth has ceased so the seed will be ready to germinate when spring growing conditions arrive.

RATE OF SEEDING AND PASTURE MIXTURES

Usually one or two adapted grasses with a single legume is as good as, or better than, a "shotgun" mixture. About 10 to 13 pounds of pure live seed should be seeded per acre. The following are reliable mixtures adapted to the eastern areas of the state.

Southeast and East Central Areas

	lb.
Mixture 1	
Smooth brome	5
Intermediate wheatgrass	4
Alfalfa	3
Mixture 2	
Smooth brome	10
Alfalfa	3
Mixture 3	
Smooth brome or Intermediate wheatgrass	10
Birdsfoot trefoil	3

Northeast and James River Areas

	lb.
Mixture 1	
Smooth brome	5
Intermediate wheatgrass	4
Alfalfa	3
Mixture 2	
Smooth brome	10
Alfalfa	3
Mixture 3	
Intermediate wheatgrass or Crested wheatgrass	8
Alfalfa	3

Central Area (East of Missouri to James River Area)

	lb.
Mixture 1	
Intermediate wheatgrass	6-8
Alfalfa	3
Mixture 2	
Smooth brome	6-8
Alfalfa	3
Mixture 3	
Crested wheatgrass	5-7
Alfalfa	3

Note: A grass and legume mixture will produce a greater yield than a straight grass seeding. Grass alone has the advantage of not causing bloat. If you do not want to assume the hazard of bloat associated with pasturing a grass and legume mixture, then grass can be seeded alone but you must depend on commercial nitrogen to maintain maximum yields. Applications of 40 to 60 pounds of actual nitrogen per acre per year will be needed to supply the plants' needs. The rate of seeding of the grass or grasses may be increased slightly when seeded alone. The proportion of legume seed in a mixture can be increased to 4 pounds per acre if the crop is to be used for hay.

SEEDBED PREPARATION

Seed on a firm (hard) seedbed; this is important. A firm seedbed is necessary so that the small seeds may be planted at a uniform, shallow depth. On plowed land, work out air pockets, level and pack. Disked and harrowed row cropland makes a good seedbed.

DEPTH OF PLANTING

Plant about ½-inch deep. Small seedlings will not emerge if planted too deeply. Seed shallowly, yet be sure the seed is covered. The seed germinating on top of the ground has a poor chance of survival.

EQUIPMENT FOR PLANTING

Too many acres of grass and legume seeds are planted with equipment designed for planting larger seeds. The use of proper equipment for seeding small seeds is the first essential in establishing stands. The seed must be *planted* about ½-inch deep and the soil packed around the seed. Packing soil after seed is sown places the seed on contact with soil, prevents soil from drying out, and facilitates capillary rise of soil moisture near the soil surface for the germinating seedling.

Common types of seeding equipment are:

1. **Cultipacker seeder**—usually superior, but requires a surface mulch for proper planting. Light weight seeds, such as bromegrass seed may not be covered too well and also, wind can interfere with the distribution of the seed.
2. **Press drill**—good if planting depth can be regulated.
3. **Grain drill**—poor unless planting depth can be regulated and the soil packed.
4. **Broadcast and harrowed in**—usually the poorest type of planting equipment.

Note: Bromegrass seed may not feed down uniformly in a regular grain drill. Some have an agitator in the seed box to prevent "bridging-over." Mixing a small amount of cracked corn with the grass seed will help facilitate more uniform seeding.

LEGUME INOCULATION

Legume seed inoculation is always recommended. Inoculation assures that (1) nodulation will occur early in the life of the legume plant, (2) that all plants will have nitrogen-fixing bacteria available, and (3) that the most efficient strains of nitrogen-fixing bacteria are present. Inoculation of seed must be done immediately before planting.

SEED TREATMENT

Grasses: To control harmful disease organisms on grass seed, a treatment with Arasan or Spergon at the rate of 5⅓ ounces to 100 pounds of seed is recommended.

Legumes: Use Arasan or Spergon at the rate of 5⅓ ounces to 100 pounds of seed. This seed treatment must be done about one week in advance of planting. This is necessary to avoid injury to the bacterial inoculant that is applied at seeding time. Inoculate just enough of the treated seed to fill the drill box for immediate planting. *Do not treat previously inoculated seed.*

STARTER FERTILIZER

A soil test is recommended to determine the right kind and rate of application of fertilizer. An application of 10 to 20 pounds of nitrogen and 20 to 50 pounds of phosphorus per acre will normally provide nutrients for the young seedling. Use a fertilizer with a ratio ranging from 1-1-0 to 1-4-0, depending on the soil test. This will give greater assurance of establishing a stand. Depending on soil tests, subsequent applications of commercial fertilizer may be needed to maintain maximum pasturage.

A starter fertilizer may be applied with a fertilizer attachment on the grain drill or spread on the soil surface and worked in by disking or harrowing. Research tests show that best results are obtained by placing the fertilizer in a band slightly below the seed; however, fertilizer attachments for this purpose are not generally available.

COMPANION CROP

In areas of limited rainfall, companion crops (nurse crops) are not recommended except on soils where erosion is a hazard. When a companion crop is used, flax is considered the best, but early maturing small grains may be used. The rate of seeding of the companion crop should be reduced by one-half of the normal seeding rate for the area.

MANAGEMENT OF NEW SEEDINGS

(1) When a companion crop is used, remove it as soon as ripe. Harvesting the small grain for hay or silage is a good practice for this eliminates the competition for moisture, sunlight, and plant nutrients.

(2) When a companion crop is not used, clipping of any weed growth may be necessary. Do not let weeds make too much growth, as the excessive clippings may smother the young grass and legume seedlings. The height of the clipping will depend on the height of the seedlings. Do not cut off the small plants.

(3) New seedings should never be pastured the first season. The new stand needs to develop its root system and store food reserves in the roots.

MANAGEMENT OF ESTABLISHED PASTURE STANDS

(1) Tame grasses and legumes should not be pastured in the spring until plants reach a height of 8 to 10 inches. Crested wheatgrass is an exception as it can be grazed earlier and closer.

(2) Highest pasture returns are obtained with tame grasses and legumes when about 4 to 8 inches of growth is maintained.

(3) Pasturing should be stopped after September 15. The time from September until the soil freezes up should be allowed for these perennials to store

plant food reserves in the roots. The food reserves stored in the roots are essential to maintain winter survival and to insure vigorous spring growth and continued high yields.

(4) Rotational and strip grazing are good practices to obtain maximum production of highest quality forage. They are especially recommended under intensive grazing, with irrigation, and for dairy cattle.

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